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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PAUL RICH and CLIVE LUCA WIDDICKS

Appeal 2010-001201
Application 10/760,464
Technology Center 1700

Before CATHERINE Q. TIMM, MICHAEL P. COLAIANNI, and
RAE LYNN P. GUEST, *Administrative Patent Judges*.

GUEST, *Administrative Patent Judge*.

DECISION ON APPEAL

I. STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from the Examiner's decision to reject claims 1, 2, and 4-11. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Appellants' invention relates to an apparatus and method for processing a thin wafer without clamping failure. Clamping failure occurs due to the presence of plasma at the wafer's edge. The plasma leaks charge to the backside of the wafer causing a peeling or bowing effect in thin wafers. (Spec. 2:13-3:5.) Claims 1, 4, and 9 are illustrative:

1. Apparatus for processing a substrate having a thickness of 250 microns or less, said apparatus including a chamber, plasma creation element or elements for creating a plasma in a zone of the chamber and an electrostatic chuck for retaining a substrate at a substrate location in or adjacent to the zone such that an upper surface of the substrate faces away from the chuck, wherein the apparatus further includes a dark space shield disposed on the zone side of the chuck overlying a peripheral portion of the upper surface of the substrate at a location for preventing the presence of plasma between the shield and the periphery portion of the upper surface of the substrate whilst allowing processing of the substrate, wherein a material forming the shield is an electrical conductor.

4. Apparatus as claimed in Claim 1, wherein the shield is grounded.

9. Apparatus as claimed in Claim 1, wherein the material forming the shield is a metal.

The Examiner relies upon the following evidence:

<u>First Named Inventor</u>	<u>Document No.</u>	<u>Issue or Pub. Date</u>
Kravitz	US 4,426,246	Jan. 17, 1984
Keyser	US 4,762,728	Aug. 9, 1988

Arnold	US 5,423,971	Jun. 13, 1995
Francis	US 6,465,353 B1	Oct. 15, 2002
Weichart	US 2003/0075522 A1	Apr. 24, 2003
Mohn	EP 0 708 478 A1	Apr. 24, 1996
Scherer	GB 2 310 433 A	Aug. 27, 1997

The Examiner maintains, and Appellants seek review of, the following rejections:

1. The rejection of claims 1, 2, 7, and 8 under 35 U.S.C. § 103(a) as unpatentable over Mohn in view of Francis;
2. The rejection of claims 4-6 and 11 under 35 U.S.C. § 103(a) as unpatentable over Mohn in view of Francis and Weichart;
3. The rejection of claims 9-11 under 35 U.S.C. § 103(a) as unpatentable over Mohn in view of Francis and Kravitz or Keyser;
4. The rejection of claims 1, 2, 4-8, and 11¹ under 35 U.S.C. § 103(a) as unpatentable over Weichart in view of Francis and Arnold or Scherer or Mohn;
5. The rejection of claims 9 and 10 under 35 U.S.C. § 103(a) as unpatentable over Weichart in view of Francis and Arnold or Scherer or Mohn and Kravitz or Keyser.

For each rejection noted above, Appellants' arguments are directed to all of the rejected claims, as a group. Therefore, we select claim 1 as a representative claim for the first and fourth rejections, claim 4 as a

¹ Appellants' Brief lists this rejection as being directed to claims 1, 2, 4-6, and 11, rather than to claims 1, 2, 4-8, and 11 (*see* Br. 10 and 15). This appears to be no more than a typographical error since the Examiner's Final Office Action, mailed March 18, 2008, and the Examiner's Answer have consistent statements as to the stated rejection (Final Office Action, at 6; Ans. 7). Appellants have been well apprised that claims 7 and 8 are included in the Examiner's rejection.

representative claim for the second rejection, and claim 9 as a representative claim for the third and fifth rejections.

II. FIRST REJECTION - MOHN IN VIEW OF FRANCIS (CLAIMS 1, 2, 7, AND 8)

A. ISSUE ON APPEAL

A first issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support the Appellants' view that the Examiner erred in finding that the silicon carbide (SiC) plasma guard taught by Mohn is an electrical conductor within the meaning of claim 1? We answer this question in the affirmative.

B. DISCUSSION

Appellants contend that one of ordinary skill in the art would have recognized SiC as an insulator or insulating semiconductor, and not an electrical conductor as claimed (Br. 12; Reply Br. 2-3). Appellants submit Terashige² as evidence to support their position as to how one of ordinary skill in the art would have understood the electrical properties of SiC (*see* Br. 12).

The Examiner finds that SiC, a well-known semiconductor, exhibits electrical conducting properties given the right conditions, thus meeting the limitation of an "electrical conductor" as recited claim 1 (Ans. 10).

"During examination, 'claims . . . are to be given their broadest reasonable interpretation consistent with the specification, and . . . claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art.'" *In re Am. Acad. of Sci. Tech.*

² Takashi Terashige & Kazuo Okano, *Influence of Microstructural Variation on the Electrical Properties of SiC Microthermistors*, 46 IEEE TRANSACTIONS ON ELECTRON DEVICES 555 (1999).

Ctr., 367 F.3d 1359, 1364 (Fed. Cir. 2004) (*quoting In re Bond*, 910 F.2d 831, 833 (Fed. Cir. 1990)). In particular, an applicant “may demonstrate an intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Id.* at 1365.

Appellants’ Specification does not provide an express definition for the term “electrical conductor” (*see generally* Spec.). However, Appellants’ Specification states that the shield may be “made of metal, but it may also be a non-conducting body, for example it may be formed of ceramic” (Spec. 9, ll. 20-22). Accordingly, Appellants’ Specification defines ceramic as a “non-conducting body.”

While the Examiner is correct that SiC may exhibit electrical conducting properties under the right conditions, as exhibited by Appellants’ evidence (*see* Terashige, p. 555, col. 1, last ¶), Terashige also teaches that SiC is a ceramic. Thus, the Examiner’s finding that SiC ceramic is an electrical conductor would constitute an interpretation that is inconsistent with the Specification.

Accordingly, we cannot sustain the Examiner’s rejection of claims 1, 2, 7, and 8 under 35 U.S.C. § 103(a) based on Mohn in view of Francis.

III. SECOND REJECTION - MOHN IN VIEW OF FRANCIS AND WEICHART (CLAIMS 4-6 AND 11)

Dependent claims 4-6 depend from independent claim 1, and dependent claim 11 depends from independent claim 7. The Examiner applied the teachings of Mohn in the same way for the independent and dependent claims, i.e., that SiC is an electrical conductor within the meaning of claim 1, and thus would have been grounded as taught by Weichart (Ans.

5 and 11). Accordingly, we cannot sustain the rejection of claims 4-6 and 11 for the reasons discussed above, i.e., that the combination proposed by the Examiner, using SiC as a plasma guard, fails to render obvious a plasma guard that is an electrical conductor.

Accordingly, we cannot sustain the Examiner's rejection of claims 4-6 and 11 under 35 U.S.C. § 103(a) based on Mohn in view of Francis and Weichart.

IV. THIRD REJECTION - MOHN IN VIEW OF FRANCIS, AND KRAVITZ OR KEYSER (CLAIMS 9-11)

A. ISSUE ON APPEAL

A third issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support the Appellants' view that the Examiner erred in concluding that it would have been obvious to one of ordinary skill in the art to make the plasma shield of Mohn out of metal based on the teachings of Kravitz or Keyser? We answer this question in the affirmative.

B. DISCUSSION

The Examiner contends that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Kravitz et al. or Keyser et al. because it allows for preventing discharge from occurring at the substrate holder or protecting the electrode" (Ans. 6-7). In other words, the Examiner, in this rejection, concludes that substituting the SiC of Mohn with a metal (and thus an electrical conductor), as taught by Kravitz and Keyser, would have been obvious to one of ordinary skill in the art.

However, we agree with the Appellants that “[o]ne of ordinary skill in the art would not be [sic, have been] led to form the plasma guard of Mohn et al. of a metal or which is grounded simply because Keyser et al. and Kravitz et al. describe entirely different types of shields made of grounded metal” (Br. 15).

[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. . . . [I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

KSR Int’l Co. v. Teleflex Inc., 550 U.S. 398, 418 (2007); *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998) (“hindsight” is inferred when the specific understanding or principal within the knowledge of one of ordinary skill in the art leading to the modification of the prior art in order to arrive at appellant’s claimed invention has not been explained).

Even if it is true that the function of the dark space shields of Kravitz and Keyser is “to prevent discharge from sides and bottom of the electrode,” though it appears this is not the purpose taught for Keyser’s dark space shield (*see* Keyser, col. 4, ll. 26-32), this fact alone does not provide a sufficient explanation as to why one of ordinary skill in the art would choose to make the plasma guard of Mohn out of metal. The Examiner has failed to articulate a rationale as to why this function of Kravitz and Keyser renders obvious the combination with Mohn.

Accordingly, we cannot sustain the Examiner’s rejection of claims 9-11 under 35 U.S.C. § 103(a) based on Mohn in view of Francis and Kravitz or Keyser.

V. FOURTH REJECTION - WEICHART IN VIEW OF FRANCIS
AND ARNOLD, SCHERER OR MOHN (CLAIMS 1, 2, 4-8, AND 11)

A. ISSUE ON APPEAL

A fourth issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support the Appellants' view that the Examiner erred in concluding that it would have been obvious to one of ordinary skill in the art to have used the dark space shield of Weichart disposed on the zone side of the chuck overlying a peripheral portion of the upper surface of the substrate, as recited in the claims, based on the teachings of Arnold, Scherer or Mohn? We answer this question in the affirmative with respect to Arnold and Scherer and in the negative with respect to Mohn.

B. DISCUSSION

Claim 1 recites that the dark space shield claimed is "at a location for preventing the presence of plasma between the shield and the periphery portion of the upper surface of the substrate whilst allowing processing of the substrate" (claim 1). Claim 7 recites locating the dark space shield "to prevent the presence of plasma between the shield and the periphery whilst allowing processing of the substrate" (claim 7).

We agree with the Appellants that Arnold and Scherer teach positioning a substrate on a moving carrier during processing (*see* Arnold, col. 3, l. 64 to col. 4, l. 3; *see* Scherer, p. 3, last ¶), such that the disclosed dark space shields of Arnold and Scherer have no particular relationship with the substrate. As such, the substrates would not be protected in the manner set forth in the claims.

Moreover, regarding the teachings of Scherer, we disagree with the Examiner's finding that the dark space shield overlies a periphery of the substrate (Ans. 9). To the contrary, we agree with Appellants that Scherer teaches only a diaphragm 14 overlying the periphery of the substrate, not the dark space shield 6 (*see* Scherer, Figure 1 and p. 3, second and third ¶¶).

Accordingly, we cannot sustain the Examiner's rejection of claims 1, 2, 4-8, and 11 under 35 U.S.C. § 103(a) based on Weichart in view of Francis and Arnold or Scherer.

With respect to the application of Mohn in this rejection, we adopt the Examiner's findings in the Answer as our own and add any additional findings of fact appearing below for emphasis.

Appellants contend that it would not have been obvious for one of ordinary skill in the art to use the dark space shield of Weichart in the shape and location of the plasma guard of Mohn because of the differences in materials and functions of the two structures (Br. 16-17). We disagree with Appellants.

We begin the analysis by considering the prior art from the viewpoint of one of ordinary skill in the art. *See In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000). In an obviousness analysis the question to be asked is "whether the improvement is more than the predictable use of prior art elements according to their established functions." *KSR*, 550 U.S. at 417.

Appellants do not refute the Examiner's assertion that the plasma guard of Mohn is a dark space shield (*see* Ans. 4 and 9; *see generally* Br.). Since both Mohn and Weichart teach dark space shields, one of ordinary skill in the art would expect success in using the dark space shield of Weichart overlying the periphery of the substrate as taught by Mohn and for

the purpose taught by Mohn, to avoid a current flow between the plasma and the electrostatic chuck (Mohn, col. 3, ll. 12-21 and ll. 40-46). Thus, the combination would be no more than the predictable use of known materials of Weichart according to its established function as a dark space shield as the dark space shield taught by Mohn.

The weight of the evidence taken as a whole supports the Examiner's conclusion of obviousness under the law.

Accordingly, we sustain the Examiner's rejection of claims 1, 2, 4-8, and 11 under 35 U.S.C. § 103(a) based on Weichart in view of Francis and Mohn.

VI. FIFTH REJECTION - WEICHART IN VIEW OF FRANCIS
AND ARNOLD, SCHERER OR MOHN AND KRAVITZ OR KEYSER
(CLAIMS 9 AND 10)

A. ISSUE ON APPEAL

A fifth issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support the Appellants' view that the Examiner erred in concluding that it would have been obvious to one of ordinary skill in the art to use metal as the dark space shield of Weichart, as taught by Kravitz or Keyser? We answer this question in the affirmative with respect to Keyser and in the negative with respect to Kravitz.

B. DISCUSSION

We adopt the Examiner's findings in the Answer as our own and add any additional findings of fact appearing below for emphasis.

Appellants contend that "[o]ne of ordinary skill in the art would not be led to form the plasma guard of Mohn et al. of a metal or which is grounded simply because Keyser et al. and Kravitz et al. describe entirely different

types of shields made of grounded metal” (Br. 18). Appellants’ arguments fail to address the Examiner’s particular rationale for concluding obviousness.

In this rejection, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to use metal as a dark space shield because Kravitz and Keyser teach a metal dark space shield in the same location and having the same purpose as the dark space shield of Weichart, specifically to protect the sides and bottom of the electrode (Ans. 10 and 13). Further, the Examiner concludes that it would have been obvious to use the dark space shield of Weichart (as modified by Kravitz and Keyser) in the location of and for the purpose of the dark space shield taught by Mohn, specifically to prevent plasma from affecting the chuck (Ans. 9-10 and 12-13). In focusing on the combination of Mohn and Keyser and Kravitz, Appellants do not address the similarities between the dark space shields of Weichart and Kravitz and Keyser relied upon by the Examiner. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Thus, Appellants have not provided us any reason to consider the Examiner’s rationale as untenable.

However, we disagree with the Examiner that Keyser teaches using a dark space shield to protect the sides and bottom of the electrode from a plasma charge, as the Examiner finds. Rather, Keyser teaches using the dark space shield to prevent the plasma reacting with oxygen-containing materials from a glass insulating ring 14 that supports the electrode (Keyser, col. 4, ll. 26-32). Since the Examiner’s rationale is based on a misunderstanding of the teachings of Keyser, we cannot sustain the Examiner’s rejection of

claims 9 and 10 under 35 U.S.C. § 103(a) based on Weichart in view of Francis, Mohn and Keyser.

We agree with the Examiner's finding that Kravitz teaches using a dark space shield for preventing discharge from occurring at the sides and bottom of the electrode (Kravitz, col. 6, ll. 50-59). Accordingly, we agree with the Examiner's conclusion that using metal as taught by Kravitz as the grounded material taught by Weichart would have been obvious to the skilled artisan and that one of ordinary skill in the art would use such a metal dark space shield as the dark space shield of Mohn. "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR*, 550 U.S. at 417.

The weight of the evidence taken as a whole supports the Examiner's conclusion of obviousness under the law.

Accordingly, we sustain the Examiner's rejection of claims 9 and 10 under 35 U.S.C. § 103(a) based on Weichart in view of Francis, Mohn and Kravitz.

VII. CONCLUSION

On the record before us and for the reasons discussed above, we sustain the rejection of claims 1, 2, 4-8, and 11 under 35 U.S.C. § 103(a) as unpatentable over Weichart in view of Francis and Mohn and the rejection of claims 9 and 10 under 35 U.S.C. § 103(a) as unpatentable over Weichart in view of Francis, Mohn and Kravitz.

However, we do not sustain the rejection of claims 1, 2, 7, and 8 under 35 U.S.C. § 103(a) as unpatentable over Mohn in view of Francis, the

rejection of claims 4-6 and 11 under 35 U.S.C. § 103(a) as unpatentable over Mohn in view of Francis and Weichart, the rejection of claims 9-11 under 35 U.S.C. § 103(a) as unpatentable over Mohn in view of Francis and Kravitz or Keyser, the rejection of claims 1, 2, 4-8, and 11 under 35 U.S.C. § 103(a) as unpatentable over Weichart in view of Francis and Arnold or Scherer, and the rejection of claims 9 and 10 under 35 U.S.C. § 103(a) as unpatentable over Weichart in view of Francis and Arnold, Scherer or Mohn and Keyser.

VIII. DECISION

We affirm the Examiner's decision.

IX. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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